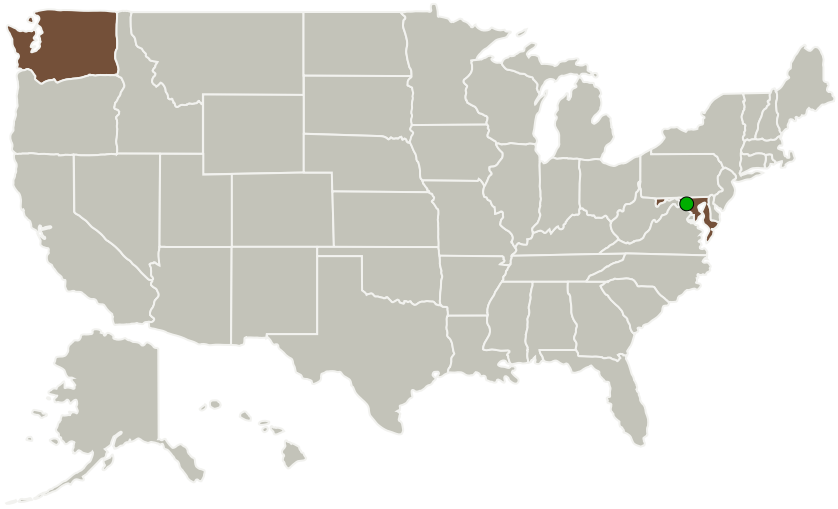
LENA Conversion Foils Using Single-Layer Graphene, Phase I

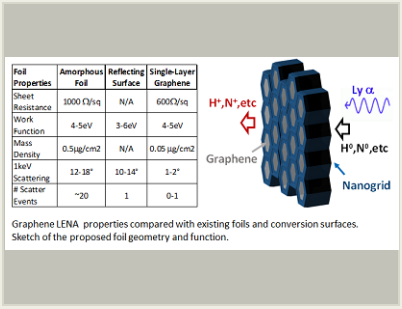
Completed Technology Project (2016 - 2016)

Project Introduction

Our key innovation will be the use of single-layer graphene as LENA conversion foils, with appropriate microgrids and nanogrids to support the foils. Phase I develops a way to make the freestanding foils with usable size and perfection, and investigates added features such as EUV blocking. Phase II will make modifications to the graphene foil itself as needed for specific types of missions. For example, the existing graphene may be suitable in cases where incident LENA flux is high and the energy range of the instrument is high. Modified graphene may be necessary to increase conversion efficiency for converting to particular species, such as H+ or O-. In our proposal, we have fabricated small graphene coupons using existing methods, and shown these to optically consist of a carbon monolayer. The single-layer graphene mass density is 10X lower than conventional amorphous carbon foils. The Phase I activities build on this demonstration, and advances the TRL from the present TRL3 to TRL4. Phase I also comprises modeling and analysis in preparation for Phase II, which is expected to begin at TRL4 and end at TRL6.

Primary U.S. Work Locations and Key Partners





Graphene LENA properties compared with existing foils and conversion surfaces. Sketch of the proposed foil geometry and function.

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Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Luxel Corporation	Lead Organization	Industry Small Disadvantaged Business (SDB)	Friday Harbor, Washington
Goddard Space Flight Center(GSFC)	Supporting Organization	NASA Center	Greenbelt, Maryland

Primary U.S. Work Locations	
Maryland	Washington

Project Transitions

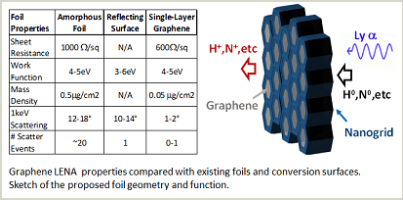
June 2016: Project Start

December 2016: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139662)*

Images



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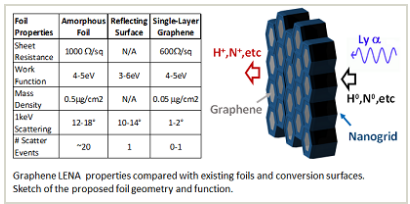
Briefing Chart Image
LENA Conversion Foils Using Single-Layer Graphene, Phase I *(https://techport.nasa.gov/image/131218)*



Graphene LENA properties compared with existing foils and conversion surfaces.
Sketch of the proposed foil geometry and function.

Final Summary Chart Image
LENA Conversion Foils Using Single-Layer Graphene, Phase I Project Image *(https://techport.nasa.gov/image/125966)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Luxel Corporation

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

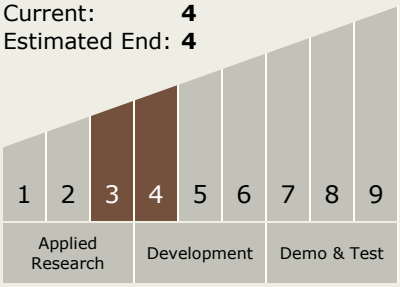
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Bruce Lairson

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System